

Applicant: KOEHLER, Joachim , et al.
Serial No.: 10/591,565
Filing Date: May 7, 2007
Amendment in Response to October 13, 2011 Office Action
March 13, 2012
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REMARKS

The present application had claims 1-3, 5 and 11-20 pending. Claims 1-3, 5, 11-16, 19 and 20 have been amended herein, and claims 17 and 18 have been canceled. Accordingly, claims 1-3, 5 and 11-16, 19 and 20 are presently pending.

Support for the amendment of claim 1 may be found throughout the application, including in previously pending claim 18. The remaining amendments are minor in nature and were made to make the dependent claims consistent with the new amended language of claim 1. None of the amendments introduces new matter to the disclosure.

In the October 13, 2011 Office Action, the Examiner rejected claims 1-3, 5, 11-17 and 20 under 35 U.S.C. §103(a) as being allegedly unpatentable over EP 1 229 600 (hereafter EP '600) in view of Yamamoto, *et al.* (US 6,797,426). Process claims 18 and 19 were also rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over EP '600 in view of Yamamoto and further in view of Iwase et al. (US 6,245,453). Applicants respectfully disagree with the Examiner's positions.

Initially, Applicants point out that the presently claimed invention is now directed to a process for operating a membrane fuel cell stack with dry, unhumidified operating gases -- i.e., in dry operating conditions (see e.g., the specification, page 6, lines 1-9, and claim 1). As set forth in the specification:

"In the context of the present application, "operation with unhumidified gases" means that the fuel cell is operated with operating gases which are not additionally moistened by external apparatuses, i.e. which have a water content which corresponds to that of the initial state or the state of use What is decisive is that an external humidifier (for example a "bubbler") is dispensed with

here. (specification, page 4, lines 10-21) (emphasis added).

Accordingly, the present invention is now limited to a process wherein the MEU is operated with dry, unhumidified gases and without external humidifiers. As pointed out in the specification, shorter start-up times and improves performance is provided for the fuel cells operated in accordance with the present invention (see the specification, page 7, line 30 to page 8, line 13).

EP '600 is cited as the primary reference by the Examiner. The reference is discussed in the present application at page 5, lines 26-36. As pointed out in the specification, EP '600 does not disclose or discuss processes wherein the MEUs are operate with dry, unhumidified gases or where dry, unhumidified gases are fed to both the anode and cathode of the membrane electrode unit – as now required by the pending claims.

Moreover, even if EP '600 is combined with Yamamoto, there is no teaching or suggestion directing the skilled person to operate fuel cells with dry, unhumidified gases and without external humidifiers. As mentioned above, EP '600 is silent as to this aspect, and Yamamoto shows no preference (see Yamamoto, col. 15, lines 36-39) and has no teaching on this aspect. Thus combining the references would not teach or suggest the claimed process of operating a membrane fuel cell stack with dry, unhumidified gases or the claim limitation “providing or feeding dry, unhumidified gases to both the anode and cathode of the membrane electrode unit”.

The Examiner appears to agree with this assessment on page 6 of the Office Action – “*EP '600 combination [EP '600 and Yamamoto] does not disclose operating with dry, unhumidified gases*” (October 13th Office Action, page 6, para. 4).

Later in the Office Action, however, while discussing Applicants' response to the prior rejection of previously pending process claim 18, the Examiner asserts that Figure 2 of Yamamoto suggests operating a fuel cell with dry, unhumidified gases:

“Yamamoto et al. in Figure 2 disclose a supply of hydrogen (921) and a supply of oxygen (93) that suggests a dry, unhumidified gas and Iwase et al. disclose a dry gas. Thus, the combination discloses feeding dry, unhumidified gases to the anode and cathode” (October 13th Office Action, page 13, last para.)

The Examiner's assertions regarding Figure 2 of Yamamoto are incorrect. First, a schematic representation of the hydrogen and oxygen supplies of a fuel cell does not teach that the gases are dry and unhumidified. More importantly, however, the drawing and accompanying text clearly indicates that the gases, particularly the oxygen, are not dry or unhumidified.

As shown in Figure 2 of Yamamoto, and as described in the accompanying text in columns 16-18, the Yamamoto system includes a water supply means (94) and a gas-liquid mixing means (95) for mixing air and water prior to being supplied to the oxygen electrode (see col. 16, lines 56-59). Oxygen, in the form of air, goes from oxygen supply means 93 through pipe 931 into gas-liquid mixing means 95 (col. 17, lines 4-6). Water from water supply means 94 is also supplied to gas-liquid mixing means 95 through pipe 942 (col. 17, lines 7-15). The gas-liquid mixing means (95) has nozzle 951 to spray water into the air in space 952 prior to introduction into the oxygen electrode (col. 17, lines 21-25, and col. 18, lines 8-14).

Accordingly, Yamamoto does not only fail to teach the supply of dry, unhumidified gas to both the anode and cathode of the membrane electrode unit (as required by claim 1), but also specifically teaches away from the claimed invention by

instructing that the gas supplied to the cathode first be mixed with water.

Additionally, even if Yamamoto is combined with Iwase, the presently claimed invention is not reached. As pointed out in Applicants' last response, Iwase teaches the use of dry gases as an option to humidified gases. Both operating conditions are reported with no preference. However, the described dry gas operation of Iwase still requires a humidity of the fuel gas of 100%. See Iwase, col. 12, lines 40-45; specifically, line 44-45:

“... a second condition using dry gas (humidity of the fuel gas and oxygen-containing gas were 100% and 30% respectively)”.

Thus the skilled person upon reading Iwase would not consider “providing or feeding dry, unhumidified gases to both the anode and cathode of the membrane electrode unit” – as required by amended claim 1 (emphasis added). In the present invention unhumidified gases are fed to both the anode and the cathode side -- a feature not disclosed, taught or suggested in Yamamoto or Iwase or any combination of the two.

The remaining pending claims of the present application all depend from, and contain all the limitations of, independent claim 1, and thus are patentable over the cited references for the same reasons as outlined above.

In sum, a skilled artisan in the art field would not arrive at the presently claimed invention based on the teachings of the cited references, either alone or in combination.

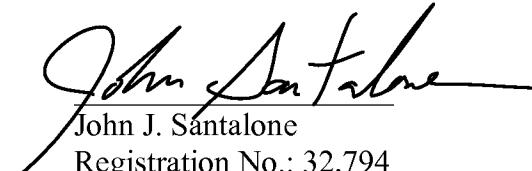
In light of the amendments and remarks above, Applicants request reconsideration and withdrawal of the rejections set forth in the October 13, 2011 Office Action and respectfully solicit allowance of the present application.

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No fee is believed to be required in connection with the filing of this response, other than the fee for the requested two-month extension of time and the fee for the accompanying RCE, which Applicants are concurrently filing with the present response. If any additional fee is deemed necessary, authorization is hereby given to charge the amount of any such fee to Deposit Account No. 50-5371.

If the Examiner has any questions regarding the present application, the Examiner is cordially invited to contact Applicants' attorney at the telephone number provided below.

Respectfully submitted,


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